REMARKS/ARGUMENTS

In response to the Examiner's final Office Action of August 10, 2004 the Applicant respectfully submits the below Remarks without further amendment to the pending claims.

Response to Examiner's comments

The Examiner sets out comments 1), 2) and 3) in response to the applicant's amendments and arguments filed in response to the previous Office Action. The applicant respectfully disagrees with these comments as follows.

1) The Examiner purports that the applicant argued Yarbrough does not disclose a heat sink. This is incorrect. The applicant argued that the beam 47 of Yarbrough does not have a heat sink positioned for direct thermal contact intermediate the ends of the beam 47, as required by claim 1. This is because Yarbrough merely discloses that it is known that a substrate formed of silicon or gallium arsenide may serve as a heat sink for active semiconductor layers and metallization formed thereon (col. 2, lines 25-36). This is not a disclosure that the beam 47 has a heat sink formed thereon.

The Examiner further asserts that Yarbrough "clearly discloses it's well known to provide material on top of the substrate to work as a heat sink" and cites the above identified passage of Yarbrough. This is incorrect. This is because, as described above, Yarbrough clearly discloses that the substrate itself may work as a heat sink when formed of silicon or gallium arsenide, not materials provided thereon.

2) The Examiner purports that the applicant argued Yarbrough does not disclose a fixed end. This is incorrect. The applicant argued that the end 47b of the beam 47 is not "a fixed end that is fast with the substrate", as required by claim 1.

The Examiner further asserts that since the end 47b of the beam 47 is attached to staple 49 then Yarbrough discloses a fixed end of the beam 47 in the context of the claimed invention. This is also incorrect. This is because the attachment of the beam end 47b to the staple 49 clearly does not "fix" the end 47b to the substrate (layer 42) so that the end 47b is "fast" with the substrate, as required by claim 1. Rather, the end 47b can be freely rotated about the staple 49, as is required so as to bring the beam 47 into position above the reflector surface after fabrication of the beam 47 (see col. 4, line 57-col. 5, line 6 and Figs. 2d and 2e of Yarbrough).

3) The Examiner purports that the applicant merely argued that it would not have been obvious to combine Goetz and Yarbrough. However, the applicant argued that it would not have been obvious to combine these two references in order to solve the problem addressed by the present invention, namely inconsistent heating along the length of the electrothermal actuator (see page 15, lines 4-19 and page 17, line 31-page 18, line 2 of the present specification). This is because neither of the references recognises this problem. Indeed, Yarbrough is completely silent as to electrothermal actuators and only concerns reflection-type antennas, and Goetz, whilst directed to electrothermal actuators, is completely silent as to the heating consideration of the actuator beams.

The Examiner further asserts that it would have been obvious to combine Goetz and Yarbrough since they are both directed to MEMS and the modified feature, as purportedly

taught by Yarbrough, is the heat sink which is well known and obvious for both references. However, the applicant further argued that even if combined, all of the claimed features would not be present in such a combination. This is because, as discussed above, Yarbrough merely discloses that it is known that a substrate formed of silicon or gallium arsenide may serve as a heat sink for active semiconductor layers and metallization formed thereon. Therefore, this disclosure of Yarbrough merely informs one of ordinary skill in the art that the silicon substrate 52 of Goetz may act as a heat sink. It does not teach or suggest that a heat sink should be provided in direct thermal contact with the actuator beams 56 of Goetz. And in any event, this would not result since the substrate 52 is not in direct thermal contact with the beams 56 (see col. 5, line 54-col. 6, line 14 and Fig. 4 of Goetz).

Regarding 35 U.S.C. 102(e) Rejection

It is respectfully submitted that the subject matter of pending claims 1 and 8 is not disclosed by Yarbrough for at least the above-discussed and following reasons.

The Examiner asserts that the beam 47 of Yarbrough undergoes thermal expansion to actuate the actuator. The applicant is unable to find any disclosure in Yarbrough of this function of the beam 47. On the contrary, Yarbrough discloses that the beam 47 is formed as a feed suspended over the reflector surface 52 for communicating signals reflected off of the reflective surface (see claim 1 of Yarbrough). Furthermore, this is the only function of the beam 47 which can be deduced from Yarbrough, since Yarbrough is only directed to a reflector antenna system and not a system incorporating electrothermal actuators.

It is respectfully submitted that Yarbrough discloses nothing which is remotely associated with the device of claim 1, nor claims 1-7 dependent therefrom. This is because the beam 47 of Yarbrough is not an "elongate electrothermal actuator". Further, the beam 47 does not have "a fixed end that is fast with the substrate" and "a free end that is displaceable along a path relative to the substrate to perform work when the actuator receives an electrical signal from the drive circuitry". Further still, the beam 47 does not have "a heat sink positioned for direct thermal contact intermediate" its ends "to disperse excessive heat build-up" therein.

Therefore, the claimed elements of claims 1 and 8 are not disclosed by Yarbrough.

Regarding 35 U.S.C. 103(a) Rejection

It is respectfully submitted that the subject matter of pending claims 1-3 and 8 is not disclosed by previously cited Goetz in view of Yarbrough for at least the above-discussed and following reasons.

The Examiner correctly identifies that Goetz does not teach or suggest a heat sink, let alone a "heat sink positioned for direct thermal contact intermediate the ends" of the beams 56. The Examiner asserts however that for the "purpose of preventing overheating condition" it would have been obvious to provide such a heat sink since Yarbrough discloses such in relation to a thermal actuator.

As discussed above, Yarbrough does not disclose a thermal actuator and merely discloses that it is known that a substrate formed of silicon or gallium arsenide may serve as a heat sink. Therefore, any combination of Yarbrough and Goetz would only have the silicon substrate 52 of Goetz acting as a heat sink. This does not provide a heat sink in direct thermal contact with the actuator beams 56 of Goetz. Moreover, it is specifically taught in Goetz that the beams are physically separated from the substrate 52 so as to be able

to move member 72 (see col. 7, lines 39-55 and Fig. 4 of Goetz). Therefore, there is no motivation to modify Goetz so as to result in the configuration required by the claimed invention.

Therefore, the claimed elements of claims 1-3 and 8 are not taught or suggest by Goetz either taken alone or in combination with Yarbrough.

Regarding Non-statutory Double Patenting Rejections

It is respectfully submitted that the subject matter of pending claims 1-8 is not unpatentable over the claims of USPs 6,612,110, 6,439,693 and 6,364,453 in view of Yarbrough for at the above-discussed and following reasons.

The Examiner asserts that for the "purpose of preventing overheating condition" it would have been obvious to provide a heat sink in the claims of USPs 6,612,110, 6,439,693 and 6,364,453 since Yarbrough discloses such in relation to a thermal actuator. However, as discussed above, Yarbrough does not disclose a thermal actuator and merely discloses that it is known that a substrate formed of silicon or gallium arsenide may serve as a heat sink. Therefore, any combination of Yarbrough and any of USPs 6,612,110, 6,439,693 and 6,364,453 would only have the substrates thereof acting as a heat sink.

Further, since USPs 6,612,110 and 6,364,453 disclose heat sinks provided on the actuator arms, there would have been no motivation for one of ordinary skill in the art to even look to the disclosure of Yarbrough as suggested by the Examiner. Furthermore, since neither USP 6,439,693 nor Yarbrough teach or suggest the problem addressed by the present invention, namely inconsistent heating along the length of the electrothermal actuator, it would not have been obvious to combine these disclosures to provide a heat sink in direct thermal contact with the actuator arms.

Notwithstanding the above remarks, a terminal disclaimer in compliance with 37 C.F.R. 1.321(c) is being submitted herewith; the present application and USPs 6,612,110, 6,439,693 and 6,364,453 being commonly owned by the applicant.

It is respectfully submitted that all of the Examiner's rejections have been traversed. Accordingly, it is submitted that the present application is in condition for allowance and reconsideration is respectfully requested.

Very respectfully,

Applicant: 

KIA SILVERBROOK
C/o: Silverbrook Research Pty Ltd
393 Darling Street
Balmain NSW 2041, Australia

Email: kia.silverbrook@silverbrookresearch.com
Telephone: +612 9818 6633
Facsimile: +61 2 9555 7762